MonoPrinter.com

MonoWare
Power Measurement

Rev. 1.2

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Revision History

Document number: MNWR-S03

Rev. 1.0	08-18-2022	Initial draft, MonoWare version: 0.43
Rev. 1.1	08-14-2023	Minor update for preparation
Rev. 1.2	01-25-2024	Updated based on MonoWare version 0.46

Please read thoroughly and contact us if you have any further questions or suggestions at info@monoprinter.com

1. Hardware setup

- This software tool is compatible with Mono3Z, Mono3MZ, Mono1B, and Mono3-2K40 series printers (8/14/2023)
- Power meter: Thorlabs PM100USB (or TLMP.dll based meter) + S120VC
- If you have another hardware from Thorlabs, consult us if your power meter is compatible with this software tool
- Place the sensor head on the build surface.
- Connect the USB cable of the power meter to the PC.
- Start MonoWare and Power measurement tool.
- If your printer is Mono3Z series, *power up the projector only*. If you already turn on the printer, turn it off or disconnect the projector from the printer by pressing the ***Projector Connection Button*** as shown in Fig. 1.

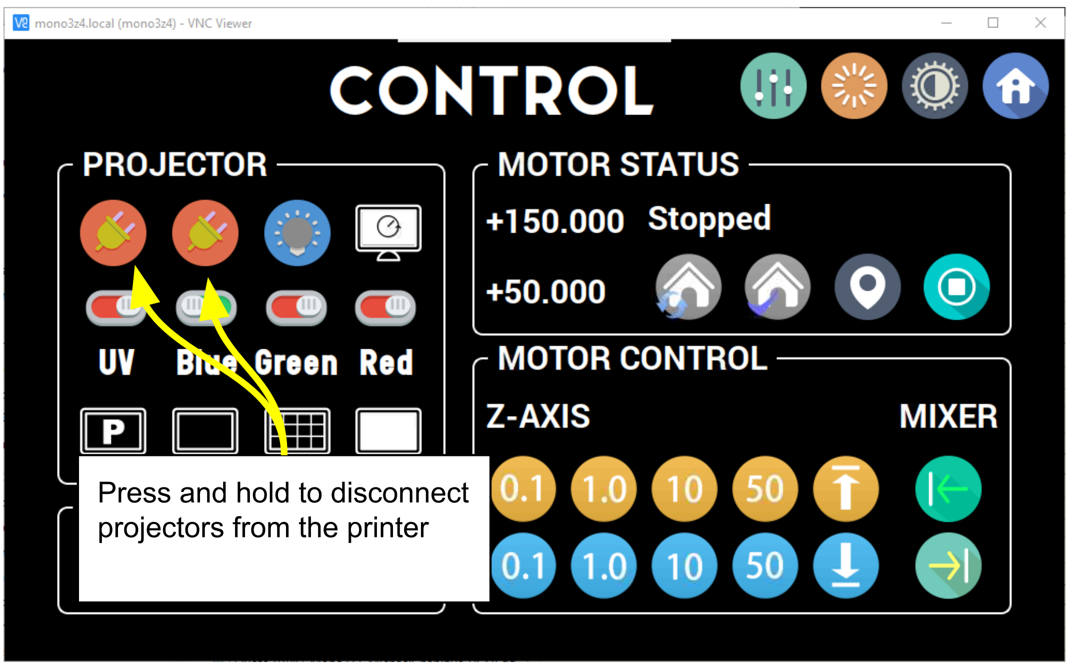

Fig. 1. Projector disconnection from the printer

2. Hardware connection from MonoWare

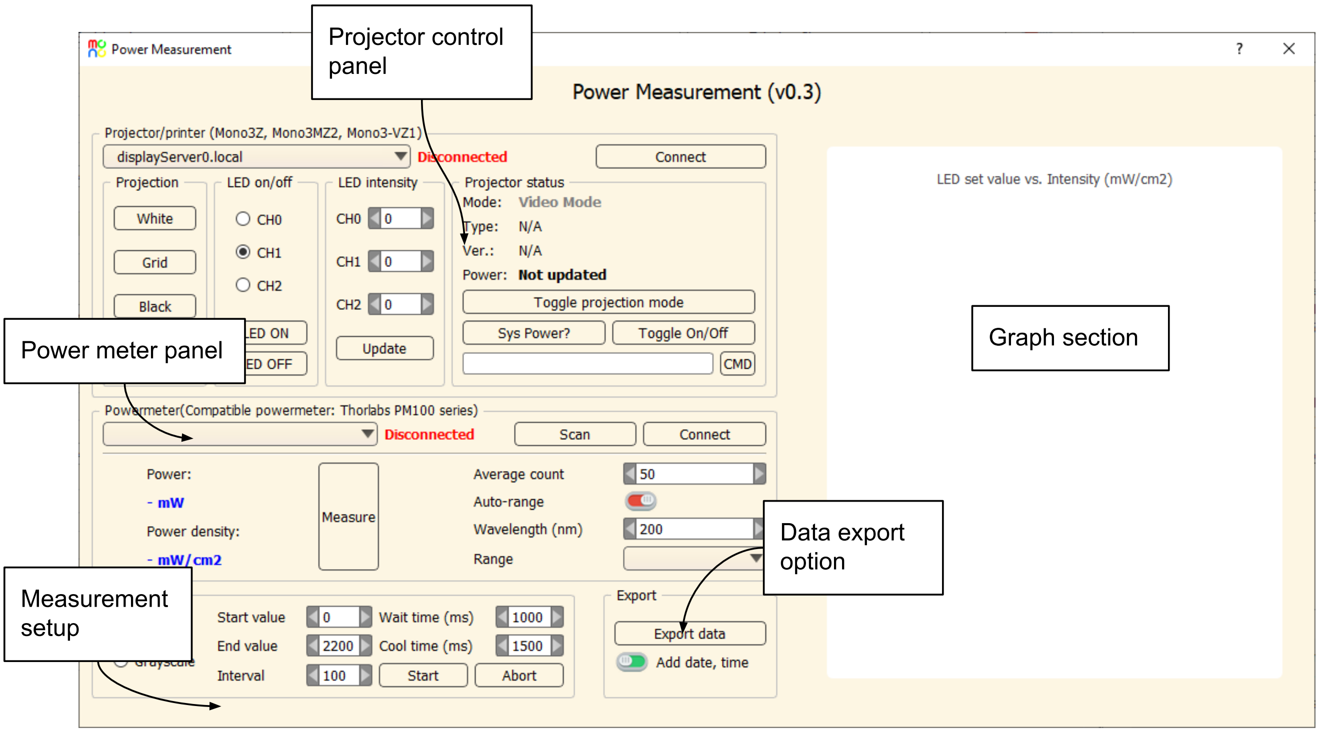

Fig. 2. Menu overview

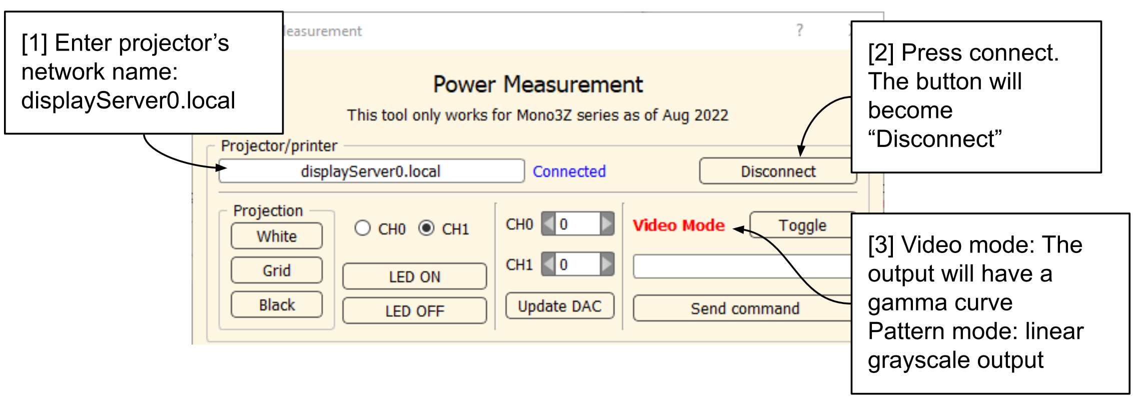

Fig. 3. Projector connection

INFO ***If the projector is not connected, check the printing station is ON and it is connected with the projector.***

- After projector connection, try to check if the connection is properly established by turning on/off the LED.
- For a linear grayscale response from the DMD, the display mode should be "Pattern mode". "Video mode" will have a gamma curve, so its output is not linear.

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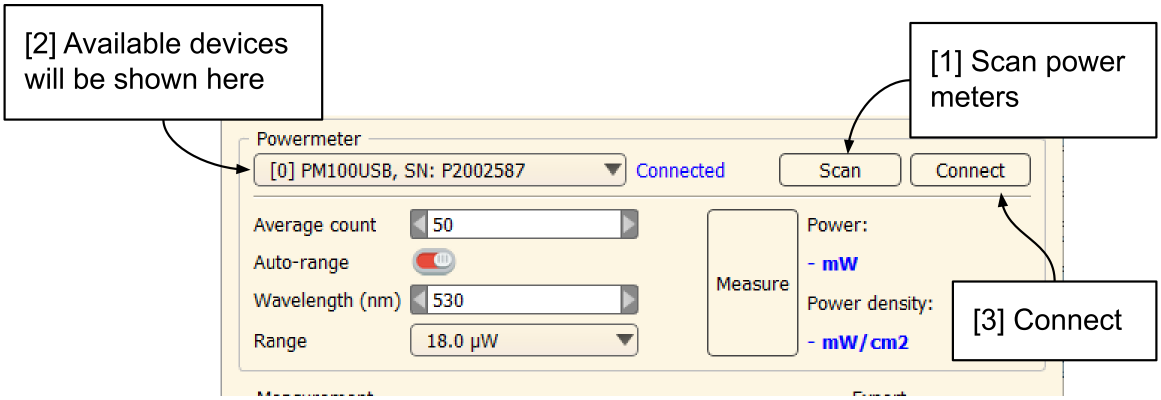

Fig. 4. Power meter connection

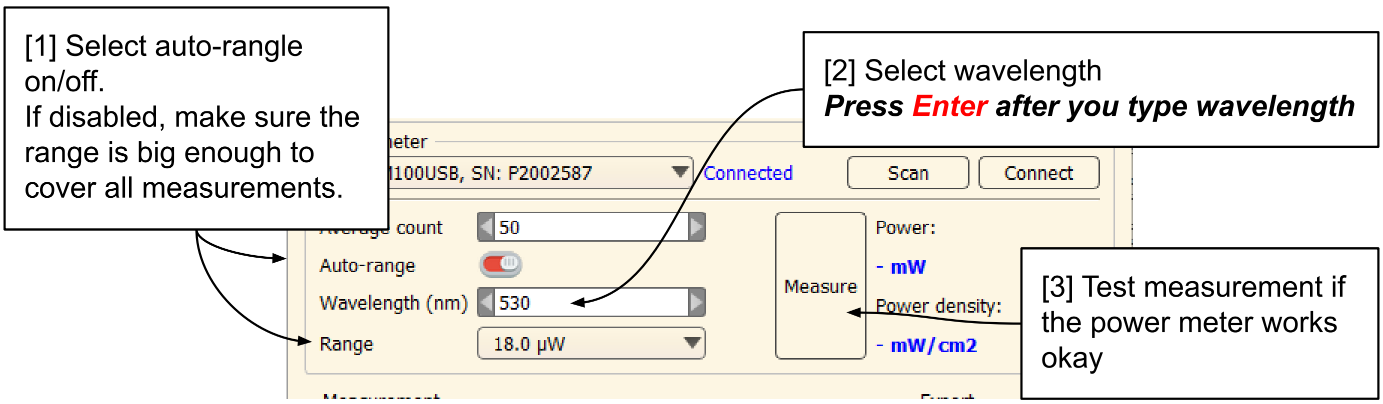

Fig. 5. Set up power meter

INFO ***If the power meter connection is not successful, check below***.

- ***Close ThorLabs power meter software. You can't connect the power meter from both ThorLabs software and MonoWare at the same time.***
- ***If you use an old software driver from ThorLabs, update the software that is using TLPM.dll (link)***

- After power meter connection, the measurement parameter should be properly set up.
- You can turn on/off the auto-range. When it's enabled, the measurement range will be automatically changed based on the light intensity. When it's disabled, a user should set a proper maximum range to avoid "inf" reading value.

CAUTION *Change "Range" box to its maximum value whenever you change the wavelength to avoid incorrect measurement*

- Then try to hit the measurement button if the power meter is working okay.

3. Measurement setup

- There are two measurement response modes: **Intensity** vs. **Grayscale**.
- ***Intensity response*** measures a curve between the LED intensity input (DAC value) vs. output light intensity. In this case, ***the projection image will be full white***.

- ***Grayscale response*** measures a curve between the grayscale vs. light intensity. In this case, the DAC value is fixed throughout the measurements.

  CAUTION *When you use the Grayscale response, use a relatively small DAC (~10-15% of maximum intensity).*

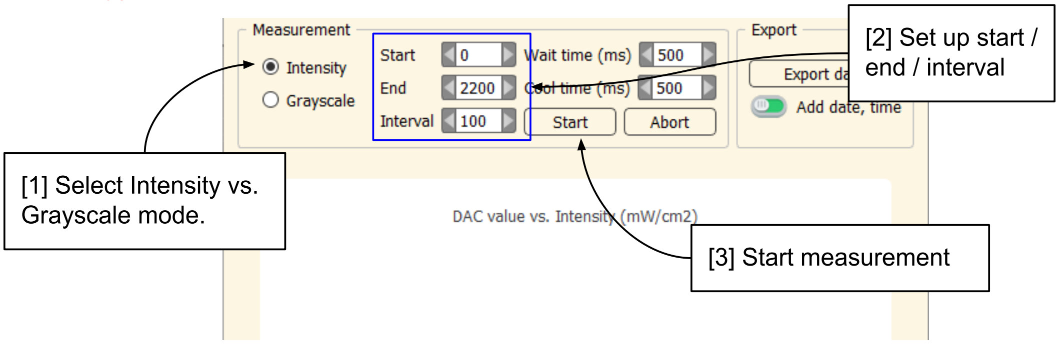

Fig. 6. Set up parameters for the Intensity measurement

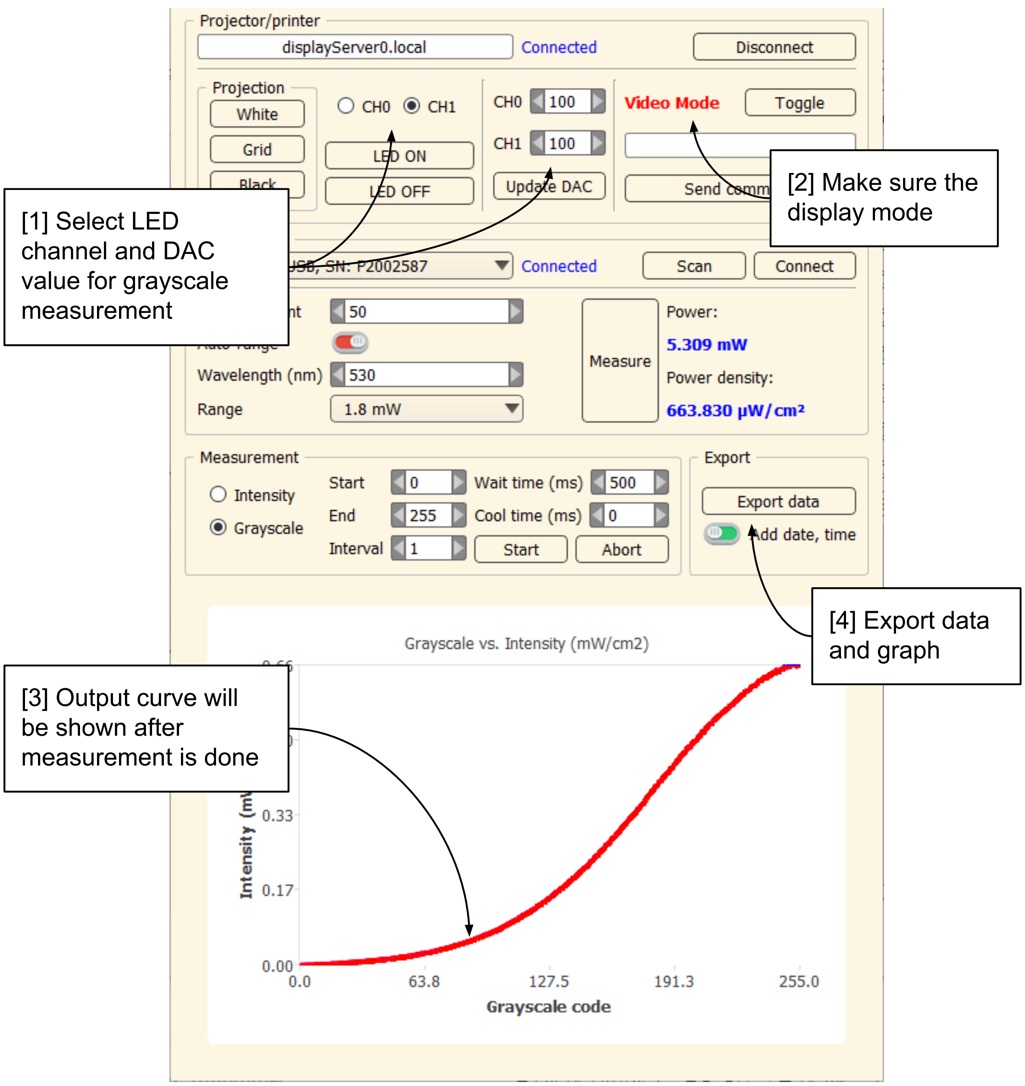

Fig. 7. Measurement output for LED CH1, DAC 100, Video mode, and Grayscale response

- Figure 7 shows an example grayscale response using Channel 1 LED, DAC value of 100, and Video mode.
  CAUTION *You have to match LED channels. For example, if the projector has 405 (CH-0) and 530 (CH-1), and if you want to test CH-1, you have to set CH-1 to be checked and power meter set to 530 nm. Otherwise, you will have wrong data.*

- As you can see, the Video mode's grayscale response is not linear, which is typical for most video devices for a better color reproduction. In most use cases with Mono3Z printers, the display mode should be "Pattern mode" to linearly match the light intensity vs. grayscale value.

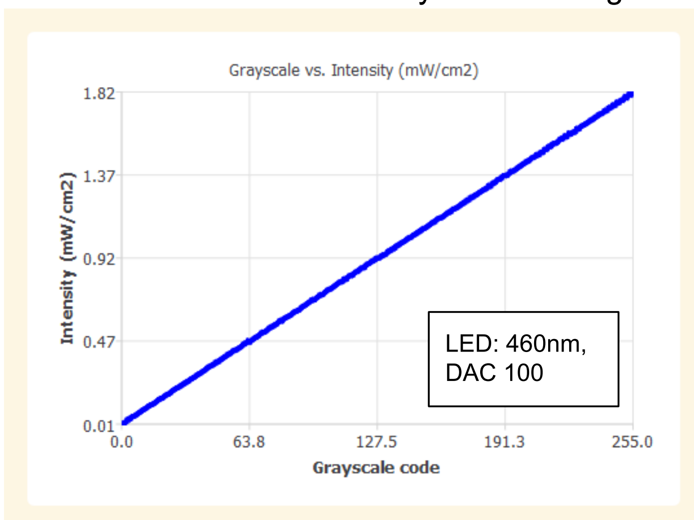

Fig. 8. Grayscale response in "Pattern mode"

- If the measurement seems correct, you can save the data and graph with the "Export" button.

4. Closing remarks

- If you have any issues while using the printer and software, please contact us at info@monoprinter.com

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